



OPERATION BORDERSTAR FIELD EVALUATION OF THE RATION, LIGHTWEIGHT, 30-DAY

BY

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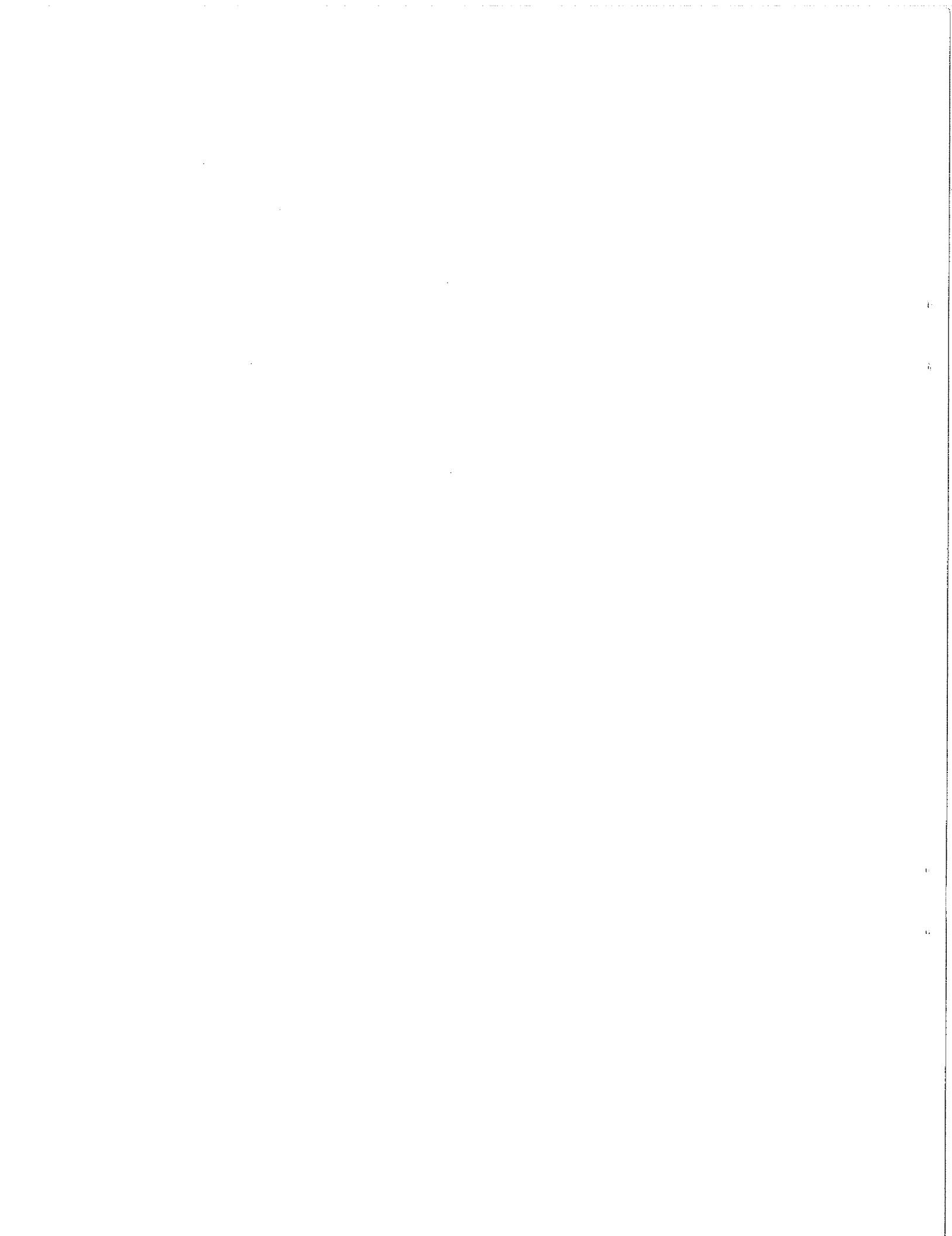
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During the period 24 March to 1 April 1985, a field test of the prototype Ration, Lightweight, 30-Day (RLW-30) was conducted at Ft. Bliss, Texas. The experiment was designed to compare the RLW-30 with the Rood Packet Assault (FPA) under field conditions. Patrol, Command & Control, and Radio troops of the 9th Infantry Division served as subjects. Subjects consuming the RLW-30 or FPA were required to keep a Daily Ration Log-Book, in which they recorded the acceptability of the ration, the amount of ration consumed, amount of water consumed, and the frequency of urinations and defecations per day. Posttest questionnaires required subjects to rate the ration on acceptability, portion size, variety, rehydration, and to recommend changes. In addition, personal interviews were conducted. Overall, the RLW-30 performed well in this first operational field test. Acceptability ratings for the RLW-30 entrees were either significantly higher than or not significantly different from those of the FPA. The most desired ration changes to be made included: more bars to satisfy hunger, more variety of beverage bars, and less water required to rehydrate.

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PREFACE

During the period 24 Mar - 1 Apr 85 a field test of the prototype Ration, Lightweight, 30-Day (RLW-30) was conducted at Ft. Bliss, TX as part of work unit # AH99BF034 "Sensory and Behavioral Engineering of Low-Volume Rations." Subjects for the test were 47 members of the 9th Infantry Division Scouts of Ft. Lewis who were deployed at Ft. Bliss as part of the field exercise Operation Borderstar. The present report describes the results of this field test.

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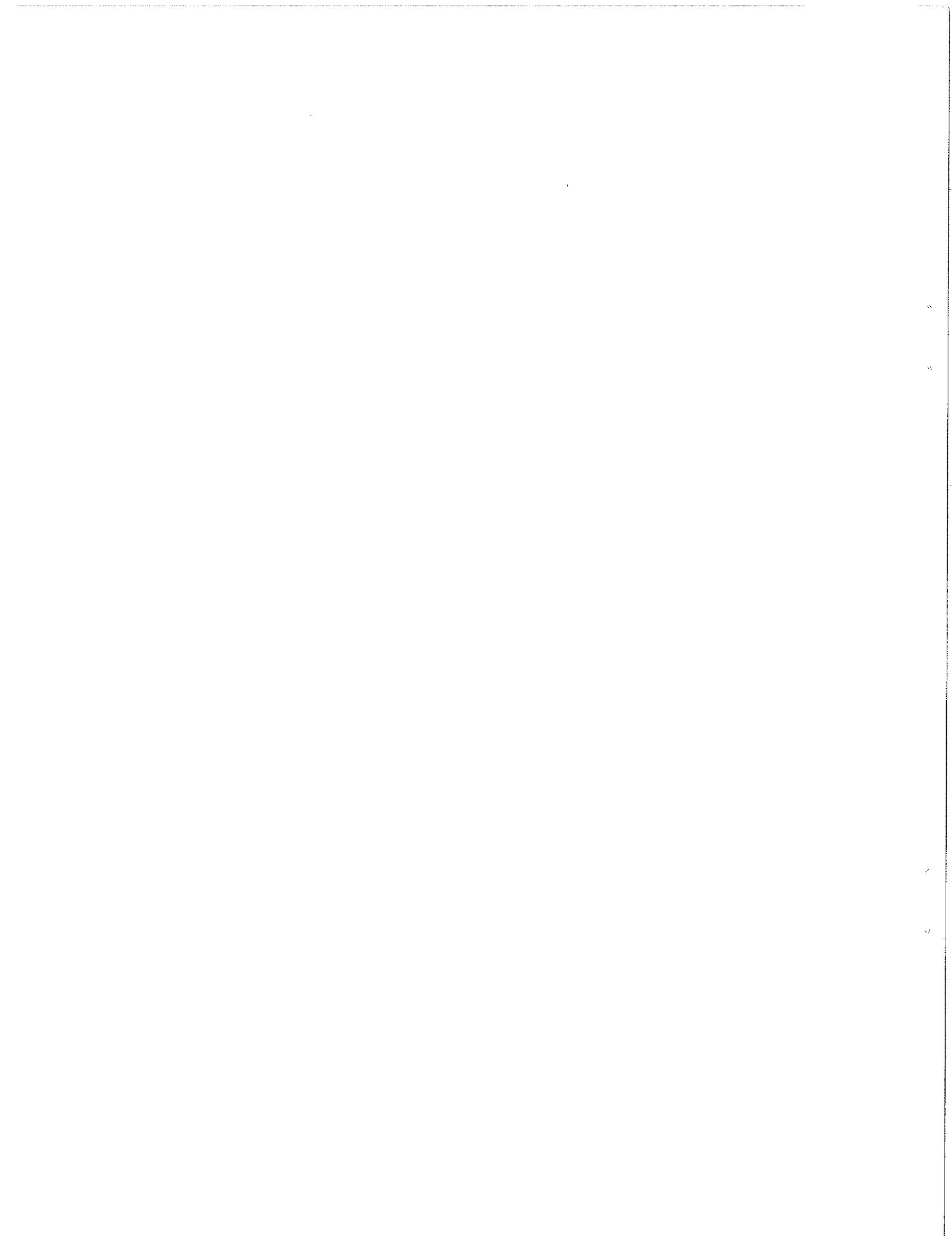


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Operation Borderstar Field Evaluation of
Ration, Lightweight, 30-Day

BACKGROUND

During the period 24 March to 1 April 85 a field test of the prototype Ration, Lightweight, 30-Day (RLW-30) was conducted at Fort Bliss, Texas. Subjects for the test were 47 members of the 9th Infantry Division Scouts of Fort Lewis who were deployed at Fort Bliss as part of the field exercise Operation Borderstar. Operational groups included one Command & Control group, one Radio group, and six Patrol groups.

The experiment was designed to compare the RLW-30 with the Food Packet Assault (FPA), which served as a control ration. Subjects were divided by ration type (RLW-30 versus FPA), and by operational mission (Patrol versus Command & Control and Radio). The breakdown of numbers of subjects in each group is shown in Table 1.

TABLE 1. Assignment of Rations (RLW-30 or FPA)
to Test by Operational Groups.

Operational Groups	# of Troops	Ration Packet
Command & Control	15	14 RLW-30 1 FPA
Radio	5	FPA
Patrols (Team ID)		
1 - 2	6	RLW-30
1 - 3	4	FPA
1 - 4	4	RLW-30
2 - 5	5	FPA
3 - 3	4	FPA
3 - 4	4	RLW-30

Each group, with the exception of the Command & Control group, received only one ration type. The Command & Control group was given 14 RLW-30 and 1 FPA (the latter due to limited quantities of the RLW-30). The Command & Control group was given the RLW-30, since this was the only group that was afforded daily access by the experimenters. Assignment of only the RLW-30 to this group enabled daily collection of information and assurance of early detection of any possible problems that might have occurred with this prototype ration.

Subjects were briefed the day prior to the start of the experiment. They were familiarized with 1) the ration components, 2) rehydration instructions, 3) how to complete the Daily Ration Log-Books (see below), 4) test conditions, 5) the importance of not taking additional food or drink to the field, and 6) the uses of the test results for future product development. After the briefing, the subjects were assigned to the ration conditions in Table 1, and each man was given 7 meals and a Daily Ration Log-Book to take with him during the exercise.

The following day the test began in garrison. Subjects ate only their assigned ration. Water was not restricted. Prior to their deployment to the field, each man's gear was inspected to insure the absence of unauthorized food. The Command & Control and Radio groups loaded their gear into trucks and drove to their field positions, where they erected tents or shelters and remained for the duration of the exercise. Any physical activity done by these groups was individually motivated. The patrols were air-mobiled by UH-60 helicopters to landing zones where they walked with all of their gear from 2 to 10km to their initial positions. Shelter for these groups consisted of dugout hides, where they covered themselves to avoid detection. Some remained there until extraction, while others moved daily. Such movements were not restricted to one or the other ration conditions.

During the 7-day field exercise, the temperatures ranged from 18°C to 27°C during the day, and from 0°C to 13°C at night. On Day 6 there was intermittent rain, and snow was noticed that night on the higher mountains. Elevation ranged from 250 meters for the Command & Control group to 1400 meters for the Radio group and from 1250 to 1400 meters for the patrols. Humidity was generally low (12 to 18%). Average daily wind speeds varied from 6 to 23 mph.

METHOD

Data were collected by three methods: a Daily Ration Log-Book, a posttest questionnaire, and personal interviews with patrol units following the exercise. Each man carried his own Daily Ration Log-Book into which he recorded the amounts of rations he consumed, his acceptability ratings for individual ration components, frequencies of urination and defecation, and number of quarts of water consumed. An example page of the Daily Ration Log-Book appears in Appendix A.

The posttest questionnaire was administered on the morning of Day 8, the day the subjects were extracted from the field. The questionnaire was administered in garrison after breakfast, but prior to the subjects being allowed postexercise sleep. The questionnaire required the subjects to rate ration components for acceptability, portion size, variety of individual items,

and it required responses to other questions concerning rehydration of meals and recommendations for changes to the rations. An example of this questionnaire is included in Appendix B.

Interviews of the Command & Control group were conducted daily. In addition, they were given questionnaires during the exercise that dealt with consumption and rehydration of the rations. Only the Command & Control group were given these questionnaires, as they were the only group to which daily access was afforded. A copy of this questionnaire appears in Appendix B. The Radio group was visited and interviewed on Days 4 and 7. The patrols were interviewed only on Day 8, after they completed their final questionnaires, since experimenter contact in the field could have compromised their mission.

RESULTS

A. Ration Acceptability

1. Posttest Questionnaire Results

The posttest questionnaire administered at the end of the exercise asked troops to rate the acceptability of each item in their ration on a 9-point hedonic scale (1 = Dislike Extremely, 9 = Like Extremely). Tables 2 and 3 show the means and standard deviations of the ratings for each of the components of the RLW-30 and FPA respectively. In each table, the ratings of the ration are presented separately for the Patrol and for the Command & Control/Radio groups and also for the two groups combined. In several instances (indicated in the tables), statistical tests (t-tests) determined that ration items were rated significantly different by the Command & Control/Radio group and the Patrol group. However, the reasons for these differences are not apparent, and the discussion that follows focuses on the combined means.

TABLE 2. Acceptability Ratings (Means and Standard Deviations) Obtained from the Posttest Questionnaire for Each Component of the RLW-30 for the Two Operational Groups and for the Groups Combined.

Entrees	Patrols	Command & Control/Radio	Combined
Beef Stew	7.2 (1.7)	7.0 (1.5)	7.1 (1.6)
Chicken Stew	7.6 (1.1)	7.0 (1.6)	7.3 (1.4)
Chicken Rice*	8.0 (1.0)	6.4 (1.5)	7.2 (1.5)
Spaghetti	8.3 (1.3)	7.3 (1.7)	7.8 (1.6)
Pork w/Escalloped Potatoes	6.2 (2.0)	7.0 (1.5)	6.6 (1.8)
Bread Alternate Bars			
Cheese	6.9 (2.0)	6.4 (2.3)	6.6 (2.1)
Cheese & Bacon	7.0 (2.5)	5.8 (3.4)	6.4 (3.0)
Pizza	7.5 (1.4)	6.8 (1.8)	7.2 (1.6)
Raisin	8.7 (0.5)	6.6 (2.5)	7.2 (2.1)
Coconut	8.7 (0.5)	6.1 (2.8)	6.9 (2.6)
Dessert Bars			
Oatmeal*	7.0 (2.1)	8.4 (0.9)	7.8 (1.8)
Granola	6.9 (2.2)	8.2 (1.1)	7.5 (1.9)
Apple Cinnamon	7.6 (1.5)	7.9 (1.3)	7.8 (1.4)
Blueberry	7.5 (1.9)	7.4 (7.0)	7.4 (1.8)
Pecan	7.9 (1.6)	8.1 (1.1)	8.0 (1.4)
Chocolate Chip	8.4 (1.0)	8.0 (1.3)	8.2 (1.2)
Chocolate Halva	8.2 (1.2)	7.9 (1.4)	8.0 (1.3)
Chocolate Bar*	5.6 (2.4)	3.5 (7.3)	4.6 (7.6)

TABLE 2. (cont.)

	Patrols	Command & Control/Radio	Combined
Beverages			
Orange Beverage	7.0 (1.7)	6.6 (2.4)	6.8 (2.1)
Tea Mix	7.9 (1.9)	8.2 (1.7)	
Fruit Pockets			
Apple	8.0 (1.4)	8.4 (0.8)	8.2 (1.2)
Apricot	7.9 (1.4)	7.4 (2.5)	7.7 (2.0)
Grape	8.0 (1.3)	8.5 (0.9)	8.3 (1.1)
Raspberry	8.3 (1.4)	8.5 (0.8)	8.4 (1.1)
Cherry	8.0 (1.7)	8.5 (0.8)	8.3 (1.4)
Strawberry	8.3 (1.4)	8.5 (0.8)	8.4 (1.1)
Dairy Bars			
Orange-Pineapple-Coconut	8.3 (1.4)	7.2 (2.2)	7.7 (2.0)
Mixed Nuts	8.2 (1.4)	7.2 (2.0)	7.7 (1.8)
Almond	8.4 (1.4)	7.1 (2.0)	7.8 (1.8)
Vanilla	7.9 (2.3)	6.3 (2.5)	7.2 (2.5)

*Significant difference between groups at p<.05.

TABLE 3. Acceptability Ratings (Means and Standard Deviations) Obtained from the Posttest Questionnaire for Each Component of the FPA for the Two Operational Groups and for the Groups Combined.

Entrees	Patrols	Command & Control/Radio	Combined
Chicken Stew*	5.8 (0.9)	6.8 (1.2)	6.1 (1.1)
Chicken & Rice	6.4 (1.7)	6.2 (1.9)	6.3 (1.7)
Spaghetti	7.6 (1.7)	7.3 (1.9)	7.5 (1.7)
Pork w/Escalloped Potatoes	6.5 (1.6)	5.8 (1.9)	6.3 (1.7)
Beef & Vegetables	6.0 (1.0)	6.7 (2.0)	6.2 (1.4)
Chicken a la King	7.0 (1.5)	6.7 (1.2)	6.9 (1.4)
Dessert Bars			
Oatmeal	8.2 (1.1)	8.0 (1.5)	8.1 (1.2)
Granola	5.8 (1.5)	6.0 (1.4)	5.8 (1.4)
Fig Bar	8.8 (0.9)	7.8 (1.3)	8.5 (1.1)
Chocolate Pudding	6.2 (1.9)	7.8 (1.3)	6.7 (1.9)
Vanilla Pudding	7.6 (1.6)	7.5 (2.3)	7.6 (1.8)
Beverages			
Orange Beverage	7.3 (1.6)	8.3 (1.2)	7.7 (1.6)
Dried Meat			
Beef Jerky	7.8 (1.3)	7.8 (1.2)	7.8 (1.3)
Pepperoni	8.2 (1.1)	8.0 (1.3)	8.1 (1.5)
Chocolate Bar	7.0 (1.5)	7.4 (1.1)	7.1 (1.4)

*Significant difference between groups at p<.05..

Ratings of the RLW-30

With the exception of the chocolate bar, all items in the RLW-30 were rated positively. The mean ratings were typically above "7" (Like Moderately) and in several instances above "8" (Like Very Much). The novel components in the ration were well received, with the dairy bars averaging between 7.2 and 7.8, the fruit pockets between 7.7 and 8.4, and the bread alternate bars between 6.4 and 7.2. Similar ratings were obtained for the entree and dessert bars. It should be noted that the mean rating for the coconut bread bar is based on responses from only 10 individuals (three in the Patrol group, seven in the Command & Control group); 16 respondents reported never trying the coconut bar, and two respondents did not answer this item on the questionnaire. The coconut bread bar was provided less frequently in the ration than the other bread bars.

Ratings of the five entrees differed significantly (by analysis of variance). This difference was due to the relatively high rating of "spaghetti" compared to that of "pork with scalloped potatoes." There were no statistically significant differences among the bread, dessert, fruit or dairy bars.

The chocolate bar was the one item in the RLW-30 with clearly low acceptability; it should be improved or replaced in future versions of the RLW-30.

Ratings of the FPA

Ratings of the FPA were generally positive, with means of at least "6" (Like Slightly). Several of the items in the FPA were rated very favorably. For example, the beef jerky (7.8), pepperoni (8.1) and fig bar (8.5). A comparison was performed between the corresponding entrees in the RLW-30 and FPA (for example, between the RLW-30 and FPA versions of chicken stew). The chicken stew and chicken and rice entrees in the RLW-30 were rated more highly (by t-test) than the corresponding items in the FPA (7.3 vs. 6.1 and 7.2 vs. 6.3). The other entrees did not differ significantly.

The ratings of the FPA entrees differed significantly among each other, primarily due to the relatively high ratings of "spaghetti" and "chicken a la King". Among the desserts, the fig bar and oatmeal bar were preferred over the other desserts.

In the FPA, the chocolate bar was alternated with the fudge bar, resulting in higher rating for the chocolate items in the FPA than in the RLW-30. The granola bar was the least acceptable item in the FPA.

TABLE 4. Acceptability Ratings (Means and Standard Deviations) Obtained from the Daily Ration Log-Books for Each Type of Component of the RLW-30 for the Two Operational Groups and for the Groups Combined.

Type of Component	Patrols		Command & Control/ Radio		Combined	
	\bar{x}	s	\bar{x}	s	\bar{x}	s
Entree	7.4	1.5	7.2	1.2	7.3	1.4
Bread Alternate	7.0	1.8	6.5	2.4	6.8	2.0
Dairy	8.2	1.1	6.7	2.1		
Chocolate	5.4	2.0	3.7	2.4	4.7	2.3
Dessert	7.9	1.6	7.9	1.2	7.9	1.4
Beverage	6.8	2.0	6.7	2.4	6.8	2.2
Fruit Pocket	8.1	1.2	8.5	0.8	8.3	1.1
Tea Mix	8.1	1.3	7.7	1.8	7.9	1.5

TABLE 5. Acceptability Ratings (Means and Standard Deviations) Obtained from the Daily Ration Log-Books for Each Type of Component of the FPA for the Two Operational Groups and for the Groups Combined.

	Patrols		Command & Control/ Radio		Combined	
	\bar{x}	s	\bar{x}	s	\bar{x}	s
Entree	6.3	6.6	6.6	1.9	6.4	1.7
Chocolate	6.4	2.0	6.6	1.1	6.4	1.8
Beverage	7.2	1.5	7.5	1.6	7.3	1.5
Granola	6.0	1.8	5.9	1.7	5.9	1.8
Oatmeal	7.9	1.1	6.7	1.8	7.5	1.5
Pudding	7.2	1.4	6.6	1.8	6.9	1.6
Fig Bars	8.8	0.4	7.4	1.8	8.3	1.3
Jerky/Pepperoni	8.3	0.9	7.8	1.4	8.2	1.1

2. Log-Book Results

The log-books were completed by the troops on a daily basis. Respondents estimated how much of each ration component type (entree bar, dairy bar, etc.) that they consumed and rated the overall acceptability.

The hedonic ratings recorded in the log-books are summarized in Tables 4 and 5. These ratings represent averages over the seven days of the test. Statistically significant differences (by t-test) between the Patrol and the Command & Control/Radio groups are noted in the tables.

A comparison (t-test) between the entree ratings for the FPA and RLW-30 shows that the RLW-30 entrees were rated significantly higher than the FPA entrees (7.3 vs. 6.4). The entrees and the granola bars in the RLW-30 represent processing and/or formulating changes planned to be incorporated into the FPA. The results of these evaluations indicate that these changes would be beneficial to the FPA.

Overall, the hedonic ratings recorded daily in the log-books are of similar magnitude as the corresponding hedonic ratings obtained from the final questionnaire.

B. Amounts of Ration Consumed

Daily self-reports of the amounts of each ration item consumed obtained from the Daily Ration Log-Book indicated that almost all items were consumed in the amounts provided. When asked on the posttest questionnaire what reasons led them to not eat more than they did, the majority response was that there were "not enough rations." Only three exceptions were noted. Although over 90% of the enriched chocolate bars in the RLW-30 and the chocolate/fudge bars in the FPA were consumed by the Patrol groups, only 75% of the enriched chocolate bars and the chocolate/fudge bars were consumed by the Command & Control and Radio groups. Similarly, for the pudding bars of the FPA, only 60% were consumed by the Patrol groups and 80% by the Command & Control/Radio groups. These self-reported consumption data support the acceptability data obtained on these items, showing relatively low acceptability.

In spite of consuming essentially all of the rations available to them, both the groups with the RLW-30 and FPA reported themselves on the posttest questionnaire to be "sometimes" to "often" hungry. No differences in self-reports of hunger were found between the Patrol groups and the Command & Control/Radio group. Clearly, the restricted calories in both rations result in noticeable hunger in the field.

When asked how many consecutive days they could consume the rations without a loss in acceptance, there was no observable

difference in responses between ration types, but the Command & Control/Radio groups indicated that they could subsist on their rations much longer than the Patrol groups (12 and 18 days vs. 27 and 21 days, for the FPA and RLW-30 rations, respectively). These differences between the two operational groups were statistically significant for both rations ($p < .05$).

C. Variety of Rations

When asked to rate on the posttest questionnaire the degree of variety of bars within each class of bars (beverage, dessert, entree, etc.) the only class of bars that were singled out by all groups as needing much greater variety was the beverage bars. This was reported for both the RLW-30 and the FPA. The class of items perceived as having the greatest variety was the fruit pockets.

In considering the overall variety within the ration, it should be noted that, when asked to indicate those changes that they would most like to see made in each ration system, the Patrol groups rated "increased variety" as third out of a list of 12 possible changes for both the RLW-30 and FPA. The Command & Control/Radio group with the FPA also rated variety as third out of the list of 12 possible changes. Only the Command & Control/Radio group with the RLW-30 did not rate increased variety as being an important change to make to the ration (see section E).

D. Ration Rehydration/Water Intake

Tables 6 to 9 show the responses of the subjects related to the practice of rehydrating their rations prior to consumption. As can be seen in Table 6, the entrees of both ration systems were the most frequently rehydrated items, and they were rehydrated more than half of the time. The pudding bars in the FPA were rehydrated with about the same frequency. Of the items specifying rehydration as an option, the dairy bars of the RLW-30 were the least frequently rehydrated items in either ration.

TABLE 6. Mean Ratings of Reported Rehydration of the Various 11 Categories of Ration Components for the RLW-30 and FPA.

	RLW-30				FPA			
	Patrols		Command & Control/ Radio		Patrols		Command & Control/ Radio	
	\bar{x}	s	\bar{x}	s	\bar{x}	s	\bar{x}	s
Entree	4.6	0.9	5.0	0.0	4.8	0.8	4.7	0.8
Dairy	2.2	1.5	1.6	1.0	-	-	-	-
Beverage	3.0	1.5	2.5	1.7	2.2	1.7	3.2	1.7
Pudding	-	-	-	-	4.5	0.9	5.0	0.0

Table 7 shows the data related to reasons for not rehydrating the ration components. Concerning the RLW-30, the most frequently cited reason by both the Patrol groups and Command & Control/Radio groups for not rehydrating components of the ration was that they "tasted better dry". A large percentage of those in the Command & Control/Radio group specifically noted that the texture of the items was better when eaten dry. Concerning the FPA, the Patrol group most frequently cited the "trouble involved in mixing" and the fact that there was "not enough water for mixing" as reasons for not rehydrating the components, while the Command and Control/Radio group cited the fact that the components "tasted better dry."

TABLE 7. Frequencies of Responses to the Question Concerning Reasons for Not Rehydrating the Ration Components for Both the RLW-30 and FPA.

	RLW-30		FPA	
Patrols	Command & Control/ Radio	Patrols	Command & Control/ Radio	
Tasted better dry	5	9	2	5
Better texture dry	1	6	1	2
Not enough water for Mixing	1	0	5	0
Too much trouble to mix	2	3	6	1
Not enough time to mix	3	0	1	0
Other reasons	4	1	2	1
Always rehydrated	2	2	4	2

Table 8 shows data on the use of hot water for ration rehydration. As would be predicted a priori, the Command & Control/Radio group for both rations reported greater frequencies of heating the water used for rehydration of rations than the Patrol group. The Command & Control/Radio group eating the RLW-30 heated their water for rehydration "more than half the time," while the Command & Control/Radio group eating the FPA "almost always" heated their water. In contrast, the Patrol group with the RLW-30 heated their water "less than half the time" and those with the FPA "somewhat more than half the time." A variety of reasons were cited by the Patrol group for not heating their water, but the most frequent and specific reasons were the "trouble involved in heating the water" and the "lack of group time to heat the water" (Table 9).

TABLE 8. Mean Ratings for Reported Usage of Hot Water to Rehydrate Ration Components for Both the RLW-30 and FPA (Range of Responses:
1 = Never to 5 = Always).

	RLW-30				FPA			
Patrols	\bar{x}	s	\bar{x}	s	\bar{x}	s	\bar{x}	s
Hot Water with Entree	2.2	1.4	3.7	1.4	3.6	2.0	4.7	0.5

TABLE 9. Frequencies of Responses to the Question Concerning Reasons for Not Using Hot Water to Rehydrate the Ration Components for Both the RLW-30 and FPA.

	RLW-30		FPA	
	Patrols	Command & Control/ Radio	Patrols	Command & Control/ Radio
Reasons for not using hot water				
Entrees tasted better cold	0	1	0	1
Entrees had better texture cold	0	1	0	1
Not enough water for rehydrating	0	0	1	0
No equipment available for heating	0	0	0	0
Too much trouble to heat water	4	0	5	0
Not enough time to heat water	3	3	3	1
Other reasons	8	4	1	0
Always heated entree	4	6	5	4

Although even the Patrol group reported on their posttest questionnaires that they "often" had water available to rehydrate the rations, the availability of water was probably still a major factor in their lower frequency of rehydration, since the Command & Control/Radio group indicated that they "almost always" had sufficient water to rehydrate, and this difference in self-reported ratings was statistically significant ($p < .05$) for both rations.

In terms of self-reports of total water consumption, the two groups (Patrol vs. Command & Control/Radio) did not differ significantly. Both reported consuming an average of two quarts of water per day, regardless of the rations consumed, and this average volume was confirmed by both their responses on the posttest questionnaire, as well as by their responses on the Daily Ration Log-Book.

As waste elimination may relate to water balance and/or to the effects of the rations on gastrointestinal motility, self-reports of the frequencies of urination and defecation during the exercise did not differ by groups or by ration. An average of 2.7 urinations per day and 0.5 defecations per day were reported.

E. Self-Reports of Changes Required in the Rations

Table 10 is the rank ordering of the changes that subjects requested for their assigned ration.

TABLE 10. Rank Order of Recommended Changes for Each Ration and for Each Operational Group.

	RLW-30 Patrols	Command & Control/ Radio	FPA Patrols	Command & Control/ Radio
Make ration lighter	12	12	13	11
Take up less space	8	10	8	6
Make packages easier to open	7	7	8	8
Make ration req. less water to rehydrate	2	7	2	3
Rehydrate faster	8	7	7	6
Make you less thirsty	4	6	3	5
Taste' better	10	5	6	11
More variety of bars	3	3	3	3
More bars per daily ration	1	1	1	1
Fewer but larger bars	10	3	11	11
Take less bars to fill you up	5	2	8	8
Not crumble as much	5	10	11	8
Add more dried meat	N/A	N/A	5	1

The unanimous first choice of both groups, regardless of assigned ration, was that more bars be included per daily ration. These data are indicative of lack of food quantity, a fact that was also reflected in the subjects' average hunger levels. Only 9 of the 47 subjects reported that they always had enough to eat.

The second most important change requested by all, except the Command & Control group with the RLW-30, was that the rations should require less water to rehydrate. Water was a concern in all groups, except the Command & Control/Radio with the RLW-30, who had ready access to water resupply. However, the remaining groups had to carry their entire water requirements for the seven-day exercise (averaging just under two quarts of water per day for both drinking and rehydration) and felt that too much of their daily ration of water was being used for rehydration.

The third most frequent response of the groups was that there be more variety. This was supported by the ratings of the variety of the individual items. It should be noted, that for the item that varied six of the seven days, the fruit pocket, that the average was still 1.6, on a scale ranging from 1 to 4, ("enough" [1] to "should have much more" [4]). It would seem that the variety of the food is quite important, but that even with essentially unlimited variety, the subjects still would like more. Two items were singled out for their need of more variety, the orange beverage bar for both ration conditions, and the chocolate bar with toffee for the RLW-30. (In the FPA, the chocolate bar with toffee was alternated with the chocolate fudge bar.) The last choice for improvement in both rations was that they should be lighter.

F. Self-Reported Importance of Ration Characteristics

Table 11 shows the frequency of responses by group and by ration concerning the subjects' opinion of the one most important factor for a field ration for use within their operational mission. As can be seen, the patrols overwhelmingly chose the characteristic that "it gives me enough energy to do my job." This was followed by "takes up little space" and "tastes good." The Command & Control/Radio group consuming the RLW-30 most frequently chose "takes up little space," followed by "lightweight" and "gives me enough energy to do my job," while those consuming the FPA had variable responses.

TABLE 11. Frequencies of Responses to the Question Concerning
the Single Most Important Characteristic of an
Operational Ration

	RLW-30		FPA	
	Patrols	Command & Control/ Radio	Patrols	Command & Control/ Radio
Light weight	0	3	0	1
Takes up little space	2	6	3	0
Tastes good	1	0	0	1
Stops my hunger	1	1	1	1
Gives me enough energy to do my job	8	3	9	1

CONCLUSION

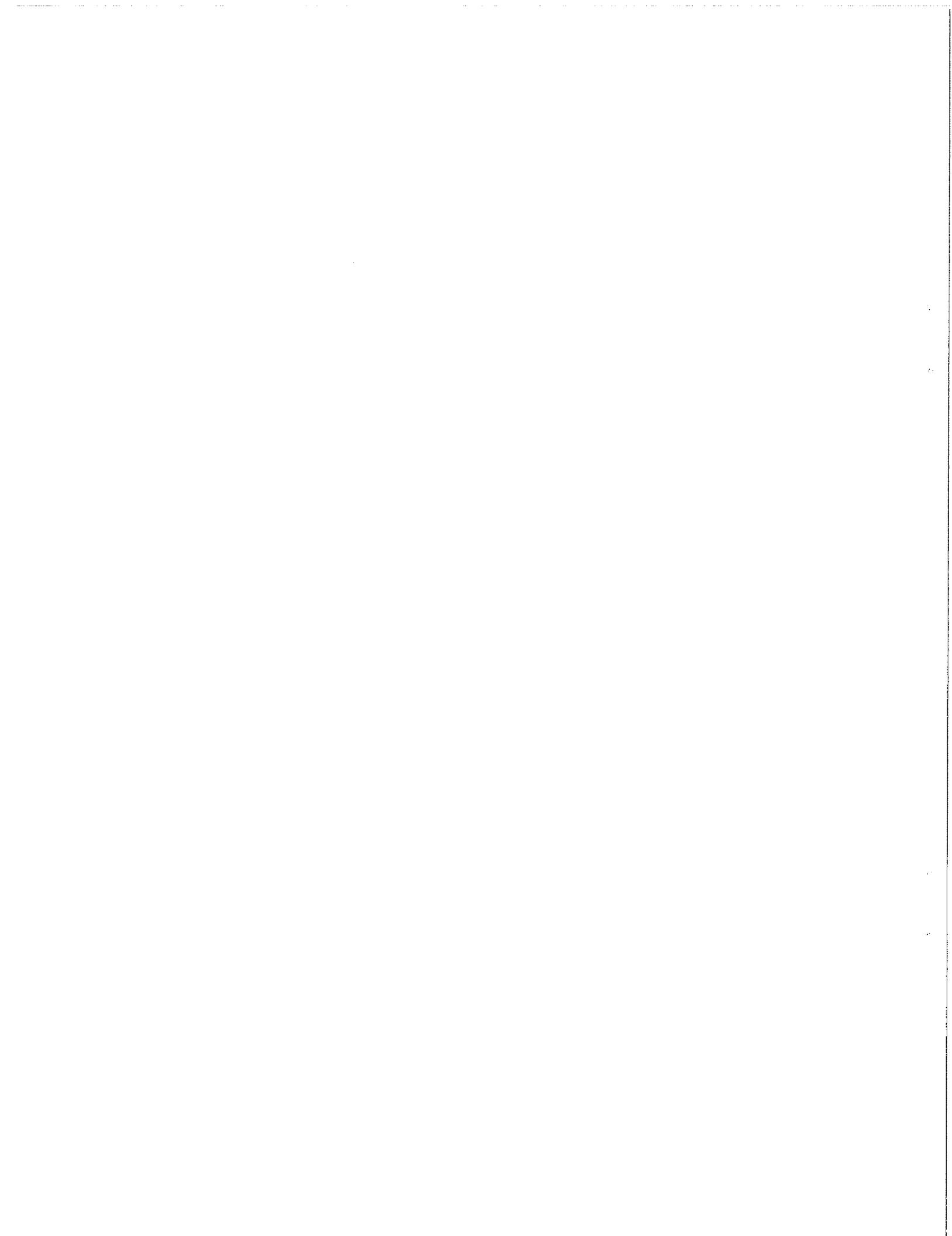
It is quite clear from both the daily log-book and posttest questionnaire data obtained during this test that, with the exception of the chocolate bar, all items of the RLW-30 were well liked, including the more novel components, i.e., dairy bars, fruit pockets and bread alternate bars. In addition, the acceptability ratings for the RLW-30 entrees were either significantly higher than or not significantly different from those of the FPA.

There was general agreement among the troops that more bars were needed on a daily basis to totally satisfy hunger, that the ration required too much water to adequately rehydrate and that the variety of certain components, e.g., beverage bars, should be increased.

With some minor exceptions, mostly attributable to the fruit pockets, the troops in the Patrol groups gave higher ratings to the rations than did the troops comprising the Command and Control or Radio groups. It appears that the greater field isolation of these troops made them more appreciative and less critical of the rations that they had available.

Overall, the RLW-30 performed well in this first operational test. The information obtained from this evaluation will be used to improve both individual components of the ration and its overall design.

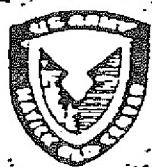
This document reports research undertaken at the US Army Natick Research, Development and Engineering Center and has been assigned No. NATICK/TR-87/034 in the series of reports approved for publication.



APPENDIX A

Sample Pages, Daily Ration Log-Books

DAILY RATION LOG-BOOK



US Army Natick
Research & Development Center
Natick, MA 01760

Name _____
Rank _____
Platoon _____
Team _____

INSTRUCTIONS

As part of our study of new rations, we need to know how much you like your ration items, how many of them you eat and how they affect your bodily functions. It is important that the information be very accurate; therefore, please fill out this booklet once per day. Do not wait until the end of the exercise to fill it out; it cannot be done accurately that way. Once a day, turn the booklet to the page for that day and answer each of the questions that are asked by circling one of the response choices.

Remember, fill out one form each day. Thank you for your help.

RLW-30 LOG BOOK

SUN MON TUES WED THURS FRI SAT SUN (Circle 1)

Please circle one of the numbers on the following scale to indicate how much you liked or disliked the ration items that you ate today. If you did not eat any of a particular item, place a check mark in the last column.

	Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely	Did Not Eat Any
Entree Bars	1	2	3	4	5	6	7	8	9	—
Bread Bars	1	2	3	4	5	6	7	8	9	—
Dairy Bars	1	2	3	4	5	6	7	8	9	—
Chocolate Bars	1	2	3	4	5	6	7	8	9	—
Dessert Bars	1	2	3	4	5	6	7	8	9	—
Beverage Bars	1	2	3	4	5	6	7	8	9	—
Fruit Pockets	1	2	3	4	5	6	7	8	9	—
Tea Mix	1	2	3	4	5	6	7	8	9	—

Please circle one of the numbers listed below to indicate how many of each of the components you ate during the day. If you ate more than 4 of any of the components, please write the number that you ate in the space provided.

Entree Bars	0	1	2	3	4	—
Bread Bars	0	1	2	3	4	—
Dairy Bars	0	1	2	3	4	—
Chocolate Bars	0	1	2	3	4	—
Dessert Bars	0	1	2	3	4	—
Beverage Bars	0	1	2	3	4	—
Fruit Pockets	0	1	2	3	4	—
Tea Mix	0	1	2	3	4	—

How many times did you urinate today? (Circle One)

0 1 2 3 4 5 6

How many times did you defecate today? (Circle One)

0 1 2 3 4 5 6

How many quarts of water did you drink today?
(Circle One)

0 $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 $1\frac{1}{2}$ 2 $2\frac{1}{2}$ 3 $3\frac{1}{2}$ 4

FPA LOG BOOK

SUN MON TUES WED THURS FRI SAT SUN (Circle 1)

Please circle one of the numbers on the following scale to indicate how much you liked or disliked the ration items that you ate today. If you did not eat any of a particular item, place a check mark in the last column.

Dislike Extremely	1	2	3	4	5	6	7	8	9	—
Dislike Very Much	1	2	3	4	5	6	7	8	9	—
Dislike Moderately	1	2	3	4	5	6	7	8	9	—
Dislike Slightly	1	2	3	4	5	6	7	8	9	—
Neither Like nor Dislike	1	2	3	4	5	6	7	8	9	—
Like Slightly	1	2	3	4	5	6	7	8	9	—
Like Moderately	1	2	3	4	5	6	7	8	9	—
Like Very Much	1	2	3	4	5	6	7	8	9	—
Like Extremely	1	2	3	4	5	6	7	8	9	—
Did Not Eat Any	1	2	3	4	5	6	7	8	9	—

Entree Bars	1	2	3	4	5	6	7	8	9	—
Granola Bars	1	2	3	4	5	6	7	8	9	—
Oatmeal Cookie Bars	1	2	3	4	5	6	7	8	9	—
Chocolate/Fudge Bars	1	2	3	4	5	6	7	8	9	—
Pudding Bars	1	2	3	4	5	6	7	8	9	—
Beverage Bars	1	2	3	4	5	6	7	8	9	—
Fig Bars	1	2	3	4	5	6	7	8	9	—
Beef Jerky/Pepperoni	1	2	3	4	5	6	7	8	9	—

Please circle one of the numbers listed below to indicate how many of each of the components you ate during the day. If you ate more than 4 of any of the components, please write the number that you ate in the space provided.

Entree Bars	0	1	2	3	4	—
Granola Bars	0	1	2	3	4	—
Oatmeal Cookie Bars	0	1	2	3	4	—
Chocolate/Fudge Bars	0	1	2	3	4	—
Pudding Bars	0	1	2	3	4	—
Beverage Bars	0	1	2	3	4	—
Fig Bars	0	1	2	3	4	—
Beef Jerky/Pepperoni	0	1	2	3	4	—

How many times did you urinate today? (Circle One)

0 1 2 3 4 5 6

How many times did you defecate today? (Circle One)

0 1 2 3 4 5 6

How many quarts of water did you drink today?
(Circle One)

0 $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 $1\frac{1}{2}$ 2 $2\frac{1}{2}$ 3 $3\frac{1}{2}$ 4

APPENDIX B

Posttest Questionnaires
Ration, Lightweight, 30-Day
Food Packet Assault

LIGHT WEIGHT RATION QUESTIONNAIRE

Behavioral Sciences Division
U.S. Army Natick Research & Development Center
Natick, Massachusetts 01760-5020

During the past several days you ate a new ration. We are interested in your honest reactions to these foods. Your responses to these questions are important to the future development of this ration and are strictly confidential.

1. How long have you been in the Armed Forces? _____ years _____ months

2. What is your rank? _____

3. Which of the following three groups did you belong to during this exercise? Check one.

Command & Control Radio Reconnaissance

4. Please use the following scale to indicate how much you liked or disliked each of the items in the ration you ate by circling the number that best expresses your opinion. If you never tried a particular item, please circle the "NEVER TRIED" category and leave the rating scale blank.

NEVER TRIED	DISLIKE		NEITHER			LIKE			EXTREMELY MUCH
	DISLIKE	VERY MODERATELY	DISLIKE	DISLIKE	LIKE NOR DISLIKE	LIKE	LIKE	VERY LIKE	
0	1	2	3	4	5	6	7	8	9

ENTREE BARS

a. Beef Stew	0	1	2	3	4	5	6	7	8	9
b. Chicken Stew	0	1	2	3	4	5	6	7	8	9
c. Chicken & Rice	0	1	2	3	4	5	6	7	8	9
d. Spaghetti	0	1	2	3	4	5	6	7	8	9
e. Pork w/Scalloped Potatoes	0	1	2	3	4	5	6	7	8	9

BREAD ALTERNATE BARS

f. Cheese	0	1	2	3	4	5	6	7	8	9
g. Cheese & Bacon	0	1	2	3	4	5	6	7	8	9
h. Pizza	0	1	2	3	4	5	6	7	8	9
i. Raisin	0	1	2	3	4	5	6	7	8	9
j. Coconut	0	1	2	3	4	5	6	7	8	9

NEVER TRIED	DISLIKE EXTREMELY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
-------------	------------------------	--------------------	------------------	---------------------	---------------	-----------------	----------------	----------------

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

DESSERT BARS

k. Oatmeal	0	1	2	3	4	5	6	7	8	9
l. Granola	0	1	2	3	4	5	6	7	8	9
m. Apple-Cinnamon	0	1	2	3	4	5	6	7	8	9
n. Blueberry	0	1	2	3	4	5	6	7	8	9
o. Pecan	0	1	2	3	4	5	6	7	8	9
p. Chocolate Chip	0	1	2	3	4	5	6	7	8	9
q. Chocolate Halva	0	1	2	3	4	5	6	7	8	9

FRUIT POCKET

r. Apple	0	1	2	3	4	5	6	7	8	9
s. Apricot	0	1	2	3	4	5	6	7	8	9
t. Grape	0	1	2	3	4	5	6	7	8	9
u. Raspberry	0	1	2	3	4	5	6	7	8	9
v. Cherry	0	1	2	3	4	5	6	7	8	9
w. Strawberry	0	1	2	3	4	5	6	7	8	9

DAIRY BARS

x. Orange-pineapple-coconut	0	1	2	3	4	5	6	7	8	9
y. Mixed nuts	0	1	2	3	4	5	6	7	8	9
z. Almond	0	1	2	3	4	5	6	7	8	9
Vanilla	0	1	2	3	4	5	6	7	8	9

CHOCOLATE BAR

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

ORANGE BEVERAGE BAR

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

TEA

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

5. If you had only this ration to eat on an extended mission, how many consecutive days would you be able to eat it without it adversely affecting your mission performance? Circle one number.

1 2 3 5 7 15 30 45 60 days

6. If you had to choose to eat either this ration or the Food Packet Assault on your next mission, which would you choose? Check one.

This ration Food Packet Assault

7. If changes were to be made to the rations that you ate on this mission, what are the five (5) characteristics of the ration that you would most want to see changed? Place a check mark next to the five (5) characteristics you most want to see changed.

- a. that the ration be lighter _____
- b. that the ration take up less space _____
- c. that the ration packages be easier to open _____
- d. that the ration require less water to rehydrate _____
- e. that the ration rehydrate faster in water _____
- f. that the ration make you less thirsty _____
- g. that the ration taste better _____
- h. that the ration have more variety of bars _____
- i. that there be more bars per daily ration _____
- j. that there be fewer, but larger bars _____
- k. that it take fewer bars to fill you up _____
- l. that the ration not crumble as much _____

8. We would like to know what you think of the amount of food provided by each part of the ration. Was there too little, too much or just about the right amount? Please circle one number for each part of the ration.

AMOUNT MUCH TOO SMALL	AMOUNT MODERATELY TOO SMALL	AMOUNT SOMEWHAT TOO SMALL	AMOUNT JUST RIGHT	AMOUNT SOMEWHAT TOO LARGE	AMOUNT MODERATELY TOO LARGE	AMOUNT MUCH TOO LARGE
1	2	3	4	5	6	7
a. Entree bars			1	2	3	4
b. Bread bars			1	2	3	4
c. Dairy bars			1	2	3	4
d. Orange beverage bars			1	2	3	4
e. Dessert bars			1	2	3	4
f. Chocolate bars			1	2	3	4
g. Fruit pockets			1	2	3	4
h. Tea			1	2	3	4

9. We would like to know how satisfied you were with the variety in each part of the ration. Was there enough variety or should there be more? Please circle one number for each component of the ration.

ENOUGH VARIETY	SHOULD HAVE SOMEWHAT MORE VARIETY	SHOULD HAVE MODERATELY MORE VARIETY	SHOULD HAVE MUCH MORE VARIETY
1	2	3	4
a. Entree bars		1	2
b. Bread bars		1	2
c. Dairy bars		1	2
d. Beverage bars/powders		1	2
e. Dessert bars		1	2
f. Chocolate bars		1	2
g. Fruit bars		1	2

10. How often did you have enough water available to rehydrate the food items that you wanted to rehydrate? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

11. How often was the amount of water you brought into the field enough to satisfy your thirst? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

12. Did you obtain additional pick-up water? Please circle one. YES NO

13. On the average, how many quarts of water did you use each day for drinking and eating? Please circle one number.

0	1/4	1/2	3/4	1	1½	2	2½	3	3½	4
---	-----	-----	-----	---	----	---	----	---	----	---

14. How often did you rehydrate (mix with water) the dehydrated (dry) components of your ration? Please circle one response for each component.

	LESS THAN HALF THE TIME NEVER	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
a. Entree bars	1	2	3	4
b. Dairy bars	1	2	3	4
c. Beverage bars	1	2	3	4

15. What were your reasons for NOT REHYDRATING (mixing with water) the dehydrated (dry) components of your ration? Circle ALL the reasons that apply to you. If you ALWAYS added water to your dry components, circle "g" only.

- a. Dehydrated foods tasted better dry (which ones? _____)
- b. Dehydrated foods had better texture dry (which ones? _____)
- c. Not enough water available for mixing
- d. Too much trouble to mix with water
- e. Not enough time to mix with water
- f. Other reasons
- g. Always added water to my dehydrated (dry) rations

16. How often did you use HOT water to mix with the dehydrated (dry) entree bars of your ration? Please circle one number.

NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
1	2	3	4	5

17. What were your reasons for NOT using HOT water to rehydrate your entree bars? Circle ALL the reasons that apply to you. If you ALWAYS used hot water, circle "h" only.

- a. Entree bars tasted better with cold water (which ones? _____)
- b. Entree bars had better texture with cold water (which ones? _____)
- c. Not enough water available for rehydrating
- d. No equipment available for heating
- e. Too much trouble to heat water
- f. Not enough time to heat water
- g. Other reasons
- h. Always heated my entree bars

18. For what reasons did you NOT eat enough during this exercise? Circle ALL the reasons that apply to you. If you ALWAYS ate enough during this exercise, circle "j" only.

- a. Disliked the rations
- b. Not enough rations
- c. Not enough time to prepare rations
- d. Too much trouble to prepare rations
- e. Not enough time to eat
- f. Too cold to stop and eat
- g. Too tired to eat
- h. Too dark to eat
- i. Other
- j. Always ate enough during this exercise

19. Overall, did you get enough to eat or were you hungry? Circle one number.

1 - Got enough to eat 3 - Was often hungry

2 - Was sometimes hungry 4 - Was almost always hungry

20. Overall, how CONVENIENT was the ration to use in the field? Please circle one number.

EXTREMELY CONVENIENT	MODERATELY CONVENIENT	SLIGHTLY CONVENIENT	NEUTRAL	SLIGHTLY INCONVENIENT	MODERATELY INCONVENIENT	EXTREMELY INCONVENIENT
1	2	3	4	5	6	7

21. For each of the items in the accessory packet, please indicate whether you needed more of the item, less of the item, or had just the right amount. If you needed either more or less, please write in how many MORE or LESS you would have wanted.

NEEDED MORE (write in number)	NEEDED LESS (write in number)	JUST THE RIGHT AMOUNT (place check mark)
----------------------------------	----------------------------------	--

- a. Toilet paper _____
- b. Spoons _____
- c. Matches _____
- d. Sugar _____
- e. Cream _____
- f. Coffee (crystals) _____
- g. Coffee cubes _____

22. Is there anything else you would like to see added to the accessory packet? If so, what?

23. Use the following scale to indicate how much you feel that eating your daily ration serves as a source of diversion/entertainment to break up the day, or as a way to kill time when not performing mission duties. Please circle one.

UNNECESSARY DIVERSION	USEFUL DIVERSION	NECESSARY DIVERSION
--------------------------	---------------------	------------------------

PLEASE TURN PAGE OVER

24. In general, what is the ONE MOST IMPORTANT factor in the design of a combat ration for a mission such as the one you were on? Circle one answer.

- a. Light weight
- b. Takes up little space
- c. Tastes good
- d. Stops my hunger
- e. Gives me enough energy to do my job

25. What privately purchased foods, if any, do you like to bring with you on a field exercise such as this?

26. What components from other rations do you choose to bring with you on a field exercise such as this (if any)?

27. Are there any foods or drinks you would like added to the ration you used during this exercise?

28. Are there any foods or drinks you would like dropped or replaced?

29. Do you have any other comments on the ration?

FOOD PACKET ASSAULT QUESTIONNAIRE

Behavioral Sciences Division
U.S. Army Natick Research & Development Center
Natick, Massachusetts 01760-5020

During the past several days you ate the Food Packet Assault. We are interested in your honest reactions to these foods. Your responses to these questions are important to the development of new rations and are strictly confidential.

1. How long have you been in the Armed Forces? _____ years _____ months

2. What is your rank? _____

3. Which of the following three groups did you belong to during this exercise? Check one.

Command & Control Radio Reconnaissance

4. Please use the following scale to indicate how much you liked or disliked each of the items in the ration you ate by circling the number that best expresses your opinion. If you never tried a particular item, please circle the "NEVER TRIED" category and leave the rating scale blank.

	DISLIKE			NEITHER			LIKE		
NEVER TRIED	DISLIKE EXTREMELY MUCH	VERY MODERATELY	DISLIKE SLIGHTLY	DISLIKE	LIKE NOR DISLIKE	LIKE	LIKE MODERATELY	VERY MUCH	LIKE EXTREMELY
0	1	2	3	4	5	6	7	8	9

ENTREE BARS

a. Beef and Vegetables	0	1	2	3	4	5	6	7	8	9
b. Chicken Stew	0	1	2	3	4	5	6	7	8	9
c. Chicken & Rice	0	1	2	3	4	5	6	7	8	9
d. Chicken A la King	0	1	2	3	4	5	6	7	8	9
e. Spaghetti & Meat Sauce	0	1	2	3	4	5	6	7	8	8
f. Pork w/Scalloped Potatoes	0	1	2	3	4	5	6	7	8	9

DESSERT BARS

k. Oatmeal Cookie	0	1	2	3	4	5	6	7	8	9
l. Granola	0	1	2	3	4	5	6	7	8	9
m. Fig	0	1	2	3	4	5	6	7	8	9
n. Chocolate/Fudge	0	1	2	3	4	5	6	7	8	9

NEVER TRIED	DISLIKE	DISLIKE	VERY	DISLIKE	DISLIKE	NEITHER NOR	LIKE	LIKE	LIKE	VERY	LIKE
	EXTREMELY MUCH	MODERATELY	SIMPLY	SLIGHTLY	DISLIKE	SLIGHTLY	MODERATELY	MUCH	MUCH	EXTREMELY	
0	1	2	3	4	5	6	7	8	8	9	
o. Chocolate Pudding	0	1	2	3	4	5	6	7	8	9	
p. Vanilla Pudding	0	1	2	3	4	5	6	7	8	9	
ORANGE BEVERAGE BAR	0	1	2	3	4	5	6	7	8	9	
BEEF JERKY	0	1	2	3	4	5	6	7	8	9	
PEPPERONI	0	1	2	3	4	5	6	7	8	9	

5. If you had only this ration to eat on an extended mission, how many consecutive days would you be able to eat it without it adversely affecting your mission performance? Circle one number.

1 2 3 5 7 15 30 45 60 days

6. If changes were to be made to the rations that you ate on this mission, what are the five (5) characteristics of the ration that you would most want to see changed? Place a check mark next to the five (5) characteristics you most want to see changed.

- a. that the ration be lighter _____
- b. that the ration take up less space _____
- c. that the ration packages be easier to open _____
- d. that the ration require less water to rehydrate _____
- e. that the ration rehydrate faster in water _____
- f. that the ration make you less thirsty _____
- g. that the ration taste better _____
- h. that the ration have more variety of bars _____
- i. that there be more bars per daily ration _____
- j. that there be fewer, but larger bars _____
- k. that it take fewer bars to fill you up _____
- l. that the ration not crumble as much _____
- m. that more dried meat be added _____

7. We would like to know what you think of the amount of food provided by each part of the ration. Was there too little, too much or just about the right amount? Please circle one number for each part of the ration.

AMOUNT MUCH TOO SMALL	AMOUNT MODERATELY TOO SMALL	AMOUNT SOMEWHAT TOO SMALL	AMOUNT JUST RIGHT	AMOUNT SOMEWHAT TOO LARGE	AMOUNT MODERATELY TOO LARGE	AMOUNT MUCH TOO LARGE
1	2	3	4	5	6	7
a. Entree bars			1 2 3 4 5 6 7			
b. Granola bars			1 2 3 4 5 6 7			
c. Oatmeal cookie bars			1 2 3 4 5 6 7			
d. Chocolate/Fudge bars			1 2 3 4 5 6 7			
e. Pudding bars			1 2 3 4 5 6 7			
f. Orange Beverage Bars			1 2 3 4 5 6 7			
g. Fig bars			1 2 3 4 5 6 7			
h. Beef jerky/Pepperoni			1 2 3 4 5 6 7			

8. We would like to know how satisfied you were with the variety in each part of the ration. Was there enough variety or should there be more? Please circle one number for each component of the ration.

ENOUGH VARIETY	SHOULD HAVE SOMEWHAT MORE VARIETY	SHOULD HAVE MODERATELY MORE VARIETY	SHOULD HAVE MUCH MORE VARIETY
1	2	3	4
a. Entree bars		1 2 3 4	
b. Granola/Oatmeal bars		1 2 3 4	
c. Chocolate/Fudge bars		1 2 3 4	
d. Pudding bars		1 2 3 4	
e. Beverage bars		1 2 3 4	
f. Fig/Fruit bars		1 2 3 4	
g. Dried meats		1 2 3 4	

9. How often did you have enough water available to rehydrate the food items that you wanted to rehydrate? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

10. How often was the amount of water you brought into the field enough to satisfy your thirst? Please circle one number.

ALWAYS	ALMOST ALWAYS	OFTEN	FAIRLY OFTEN	SOMETIMES	ALMOST NEVER	NEVER
1	2	3	4	5	6	7

11. Did you obtain additional pick-up water? Please circle one. YES NO

12. On the average, how many quarts of water did you use each day for drinking and eating? Please circle one number.

0	1/4	1/2	3/4	1	1½	2	2½	3	3½	4
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13. How often did you rehydrate (mix with water) the dehydrated (dry) components of your ration? Please circle one response for each component.

	NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
a. Entree bars	1	2	3	4	5
b. Pudding bars	1	2	3	4	5
c. Beverage bars	1	2	3	4	5

14. What were your reasons for NOT REHYDRATING (mixing with water) the dehydrated (dry) components of your ration? Circle ALL the reasons that apply to you. If you ALWAYS added water to your dry components, circle "g" only.

- a. Dehydrated foods tasted better dry (which ones? _____)
- b. Dehydrated foods had better texture dry (which ones? _____)
- c. Not enough water available for mixing
- d. Too much trouble to mix with water
- e. Not enough time to mix with water
- f. Other reasons
- g. Always added water to my dehydrated (dry) rations

15. How often did you use HOT water to mix with the dehydrated (dry) entree bars of your ration? Please circle one number.

NEVER	LESS THAN HALF THE TIME	ABOUT HALF THE TIME	MORE THAN HALF THE TIME	ALWAYS
1	2	3	4	5

16. What were your reasons for NOT using HOT water to rehydrate your entree bars? Circle ALL the reasons that apply to you. If you ALWAYS used hot water, circle "h" only.

- a. Entree bars tasted better with cold water (which ones? _____)
- b. Entree bars had better texture with cold water (which ones? _____)
- c. Not enough water available for rehydrating
- d. No equipment available for heating
- e. Too much trouble to heat water
- f. Not enough time to heat water
- g. Other reasons
- h. Always heated my entree bars

17. For what reasons did you NOT eat enough during this exercise? Circle ALL the reasons that apply to you. If you ALWAYS ate enough during this exercise, circle "j" only.

- a. Disliked the rations
- b. Not enough rations
- c. Not enough time to prepare rations
- d. Too much trouble to prepare rations
- e. Not enough time to eat
- f. Too cold to stop and eat
- g. Too tired to eat
- h. Too dark to eat
- i. Other
- j. Always ate enough during this exercise

18. Overall, did you get enough to eat or were you hungry? Circle one number.

1 - Got enough to eat

3 - Was often hungry

2 - Was sometimes hungry

4 - Was almost always hungry

19. Overall, how CONVENIENT was the ration to use in the field? Please circle one number.

EXTREMELY CONVENIENT	MODERATELY CONVENIENT	SLIGHTLY CONVENIENT	NEUTRAL	SLIGHTLY INCONVENIENT	MODERATELY INCONVENIENT	EXTREMELY INCONVENIENT
1	2	3	4	5	6	7

20. For each of the accessory items, please indicate whether you needed more of the item, less of the item, or had just the right amount. If you needed either more or less, please write in how many MORE or LESS you would have wanted.

NEEDED MORE (write in number)	NEEDED LESS (write in number)	JUST THE RIGHT AMOUNT (place check mark)
----------------------------------	----------------------------------	--

- a. Toilet paper _____
- b. Spoons _____
- c. Matches _____
- d. Sugar _____
- e. Salt _____
- f. Cream _____
- g. Chewing gum _____
- h. Coffee _____

21. Is there anything else you would like to see added as accessories? If so, what?

22. Use the following scale to indicate how much you feel that eating your daily ration serves as a source of diversion/entertainment to break up the day, or as a way to kill time when not performing mission duties. Please circle one.

UNNECESSARY
DIVERSION

USEFUL
DIVERSION

NECESSARY
DIVERSION

23. In general, what is the ONE MOST IMPORTANT factor in the design of a combat ration for a mission such as the one you were on? Circle one answer.

- a. Light weight
- b. Takes up little space
- c. Tastes good
- d. Stops my hunger
- e. Gives me enough energy to do my job

24. What privately purchased foods, if any, do you like to bring with you on a field exercise such as this?

25. What components from other rations do you choose to bring with you on a field exercise such as this (if any)?

26. Are there any foods or drinks you would like added to the ration you used during this exercise?

27. Are there any foods or drinks you would like dropped or replaced?

28. Do you have any other comments on the ration?